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THE MAGAZINE OF MOTION PICTURE PHOTOGRAPHY

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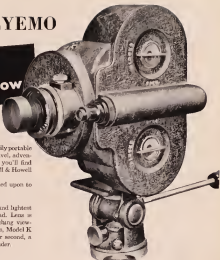
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AMERICAN CINEMATOGRAPHER

THE MOTION PICTURE CAMERA MAGAZINE

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ON THE FRONT COVER—Outdoor travelling shot on location in Mexico for the Twentieth Century-Fox Technicolor production, *Capeau from Castle*. Charles G. Clarke, A.S.C., and Arthur Ashing, A.S.C. were Directors of Photography on the production.

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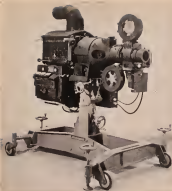
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MITCHELL BACKGROUND PROJECTOR



LIKE the famed Mitchell Camera, the Mitchell Background Projector has been designed for superior performance and utmost reliability. A high-precision instrument, this projector was developed to meet every requirement for perfect process cinematography. Typically Mitchell in design and construction, it incorporates features found in no other background projector. No covering or sound-dampening device is needed when the Mitchell Background Projector is used. Every consideration has been taken to minimize noise, and all moving parts are designed for quiet operation. The projector is mobile and self-contained. It may be moved with comparative ease and adjusted to practically any position. Its flexibility and ease of operation will save many hours of costly set-up time.

The Mitchell Background Projector is constructed in four sections: projector head, light tube, lamp house and base.

The projector head contains all the film-moving mechanism, sprockets, projector motor and the achromatic receiver used for remote control focusing. The light tube, directly behind the projector head, is a casing which contains the iris, five shutter and optical relay system. The lamp house section consists of a Mole-Richardson Type 250 lamp, together with a radiator, fan, water pump, relay box, control panel and associated wires and tubing. The optical condenser system is located in the front section of the lamp house. The base is a sturdily constructed steel unit which permits the projector to be moved with ease or positioned readily for operation.

The eccentric type movement is a pre-

cision mechanism which will perform faithfully over long periods of time. It may be operated either forward or backward. The pull-down arm has two claws on each side of the film, engaging four perforations simultaneously. Two positive registration pins are adjacent to the aperture. A special arrangement of levels provides a fast pull-down with a long dwell on the registration pins. The pull-down claws and the registration pins overlap, one entering before the other disengages. Mats with different size apertures may be inserted in the magic slot of the movement. A 180 shutter is located directly in back of the movement.

Two sprockets, located above and below the movement, are geared to the motor drive. As the film leaves the magazine it passes over idler rollers and between the adjacent sprocket and sprocket film guides, which hold it securely in place. After passing through the movement, the film moves over the second sprocket and idler rollers to the take-up reel. The film-moving mechanism will operate with equal efficiency in either direction.

The magazines are corduroy-velvet lined and are readily accessible. Each magazine has an adjustable clutch, used to regulate film tension as the film winds onto the take-up reel. An adjustable brake is also provided to regulate tension on the film being fed into the movement.

The projector motor is mounted on the bottom of the projector head and geared to the film-moving mechanism. The 720 RPM, 4-pole motor operates of 220 volts, AC, 3-phase and is reversible. It may be operated either in synclock for synchro-

nized background projection work or "wild."

The optical system is designed to project the image brilliantly and with even illumination. A flat field may be obtained or less light may be thrown on the center of the screen than on the edges. An $f/2.0$ system, of optimum Bausch and Lomb lenses throughout. All lenses are coated, increasing the light by approximately 22%. The projector optical system consists of three main elements: the condenser system, the relay system and the projection lens. Light from the arc passes first through the condenser system and into the light tube, where it comes to a focus point and is then directed through the relay system to the film aperture. It then passes through the projection lens onto the screen. An adjustable iris is installed in the light tube.

The condenser system is comprised of a protective plate, a quartz lens and a pyrex lens.

The relay system consists of two beryllium lenses separated by water. Each lens is mounted on opposite ends of a hard chrome plated, aluminum water cell. Distilled water is used between the lenses and circulating water from the radiator flows through a jacket in the cell. The use of hard chrome plating in this unit eliminates contamination of the distilled water and makes water changes necessary only about every six months. The lenses in the relay system are so well protected that they will function for approximately two years of normal operation before they require polishing.

Three projection lenses are supplied.
(Continued on Page 419)

30 YEARS OF TECHNICOLOR

By WALTER R. GREENE

TECHNICOLOR has come a long way since production of its first color feature, "The Gulf Between," 30 years ago.

Development of the present three color Technicolor process is the result of one of the outstanding engineering achievements of the motion picture industry, combined with the perseverance of president Dr. Herbert T. Kalms, who—many times during the past three decades—successfully carried the company over some precarious financial periods.

Technicolor was not the first system for putting color into the motion picture screen. There was the British Kinetoscope process—an additive method which utilized a special cumbersome projector which had a filter wheel and alternate frames of red and green on the print. Although Kinetoscope at the time was a novelty, it failed to survive due to the complexities of this machine projector which had to be set up in theatre booths for showings, and the fringing of colors was particularly noticeable. A few years later, about 1916, the American Pathé company made several features which were sent to France and hand-colored prints made via stencil method. But the cost was too great at the time, and Pathé abandoned the project.

Shortly after Technicolor was formed, the Boston consulting engineering firm of Kalms, Comstock and Weston was engaged to assist in developing a practical motion picture color process, and—with engineering enthusiasm, soon was deep in color research. At the time, Technicolor was engaged with a two-color additive process, of stenciled frame sets which demanded a minimum of laboratory procedure.

In recalling the formative years of Technicolor, Dr. Kalms, in an address at

Detroit, pointed out that the best way to prove up the process was to make a picture—so "the earliest Technicolor laboratory was built within a railway car. This car was completely equipped with a photochemical laboratory, darkrooms, fire-proof safes, power plant, offices and all the machinery and apparatus necessary for consistently carrying on the following processes on a small commercial scale: sensitizing, coating, perforating, developing, washing, fixing and drying, negative, printing, developing, washing, fixing and drying positive, washing and conditioning air, filtering and cooling wash water, examining and splicing film, and making control measurements and tests.

In 1917 the car was rolled over the railway tracks from Boston, Massachusetts, where it was equipped, to Jacksonville, Florida, where the first Technicolor adventure in feature motion picture production was to take place. The camera was the single lens, beam-splitter, two-component type, without the refinements which came later. The picture was "The Gulf Between," with Grace Darmond and Niles Welch playing the leads. Technicolor was the producer.

"During the progress of this production, February, 1917, I was invited by the American Institute of Mining Engineers to deliver a lecture at Aeolian Hall, New York, to expound the marvels of the new Technicolor process which was soon to be launched upon the public and which it was alleged by many could hardly do less than revolutionize their favorite form of entertainment. The Technicolor slogan was two simultaneous exposures from the same point of view, hence geometrically identical components had no fringes. At that time, hundreds of thousands were being spent by others trying in impossible

ways to beat the fringing of successive exposures and the parallax of multiple lenses.

I thought the Technicolor inventors and engineers had a practical solution, commercial at least temporarily, so I marched bravely to the platform at Aeolian Hall. It was a great lesson. We were, of course, introducing the color by projecting through two apertures, each with a color filter, bringing the two components into register on the screen by means of a thin adjusting glass element. Incidentally, Technicolor had so intent and develop a horizontal magnetically controlled arc which gave one-third more light for the same current than the then-standard vertical arc and which could be relied upon for constancy of position of the source. This latter was vitally important with a double aperture. During my lecture, something happened to the adjusting element, and in spite of frantic efforts of the projectionists, it refused to adjust. And so I displayed fringes wider than anybody had ever before seen. Both the audience and the press was very kind but it didn't help my immediate dilemma or afford an explanation to our financial angels.

Arrangements were made with Messrs. Klaw and Erlanger to exhibit "The Gulf Between" by means of the photoplay one week each in a group of large American cities. During one notable night in Buffalo, I decided that such special attachments on the projector required an operator who was a cross between a college professor and an ascot, a phrase which I have since heard repeated many times. "Technicolor then and there abandoned additive processes and special attachments on the projector."

Dr. Kalms pointed out that two decisions of policy must be made in the



First Technicolor laboratory was completely housed in a railroad car.



The greatest Technicolor laboratory and plant in Hollywood (left), with the English plant on the right

early development of a color process first, how far will it permit departure from standard equipment and materials, and second, how will it attempt to decide the additional requisites of recording and reproducing color between the emulsion maker, the photographic and laboratory procedure, and the exhibitor's projection machine.

Although Technicolor permanently abandoned the additive method of motion picture color many years ago, variations of that method have cropped up for experimentation and heavy financial investment in the interim, but not one reached the point of commercial practicability for general use in theatres.

Despite the unhappy experiences encountered with attempts to exhibit "The Gulf Between," Kalms and his associates did not abandon their search for a suitable color process. He stated, "As early as 1918 Technicolor had in mind two principal methods of attacking the color problem. Dr. Leonard T. Troland, who, at the time of his death, was Director of Research of Technicolor Motion Picture Corporation, had done some important pioneer work on the Monopack process. Some of his inventions were embodied in numerous patent claims which have been issued and which were intended broadly to cover the multi-layer method both for taking and printing. The other Technicolor attack was by the imbibition method. Both Monopack and imbibition were obviously capable of ultimate development into multi-component processes, but since imbibition seemed to lead more of the problems on the laboratory and relatively less on the emulsion maker we pursued it with the greater vigor.

"A first approximation to the Technicolor imbibition method consisted of two gelatin reliefs produced upon thin cellophane which were glued or welded together back to back and dyed in complementary colors. Combined with the Technicolor two-component camera, this method provided an immediately available system

(1919-21) capable of yielding two-component subtractive prints. A small laboratory or pilot plant was built in the basement of the building occupied by the Technicolor engineers, Kalms, Constock and Weston, Inc., on Brookline Avenue, Boston.

About 1919, the Prisma color company was formed to investigate the possibilities of an additive color wheel method, but quickly switched to a camera with two lenses to take the red and green images simultaneously—but this caused parallel and was abandoned in favor of a beam-splitting prism to register on two separate negatives. For prints, double-coated stock was used, with dyed images on each side. Prisma operated for several years, making and releasing one reel shorts, and J. Szwarc Blackouts' "The Glorious Adventure," produced in England and released in 1922. But, although Prisma charged 25 cents per foot for prints, losses in the laboratory were so great to run out the product, that the company finally folded.

Technicolor, with its new two-component, subtractive print method, was again forced to invest its own money in a feature picture to sell the industry on the merits of color. So "Toll of the Sea" was produced in Hollywood in 1922, and was released by Metro, although sufficient laboratory capacity made it impossible to deliver prints until the following year. These prints were made at the original pilot plant in Boston, at a manufacturing cost of around 27 cents per foot. Producers were greatly interested in color—if prints of quality of that time could be delivered for about eight cents per foot!

With a new plant building in Boston with expected capacity of 1,000,000 feet of prints monthly, a group of officials were sent to Hollywood in 1923 to set up a small laboratory and photographic unit. Some months later, Paramount contracted for Technicolor photography for "Wonder of the Wasteland," and during the six weeks of shooting, the Technicolor

group worked night and day to develop the negative—always annoyed by the thought that at least some of the negative might be ruined in processing. It turned out satisfactory, however, and 175 prints of the feature were made at price of 15 cents per foot.

"Wonder of the Wasteland" and Douglas Fairbanks' "The Black Pirate," latter made a year or so later, proved milestones in the progress of Technicolor. These two all-color features, combined with color inserts for other productions, not only supplied Technicolor with income required to carry on and develop the project, but supplied invaluable information and training for the technical and research engineers. But the release prints of "Black Pirate" created major problems in the change projection machines. The prints were double-coated cemented-together relief prints, which were considerably thicker than ordinary black-and-white film, and had a tendency to cup easily when run. When cupping occurred, the picture would jump out of focus, and field men had to replace prints for shipping back to the laboratory for de-cupping.

Kalms admitted that the double-coated process of that time was at best but a temporary method, and the work of developing a true imbibition process was being pressed by the research department to obtain single coated prints at a cost the industry could stand.

Producers recommended that Technicolor itself produce a picture to prove quality and costs, so Kalms went before the board of directors to reinforce his faith in the ultimate success of Technicolor, despite the fact it was a difficult undertaking technically, and one which required business sagacity and financial endurance. Prior to 1926 more than \$2,500,000 had been spent. The board approved capital for the production of a series of 12 two reels, and Metro distributed them worldwide.

(Continued on Page 410)

THE MEN BEHIND THE MOUSE

PART 2. How Animated Cartoons Are Made

By **HERB A. LIGHTMAN**

THE audience roars with laughter as a frustrated Donald Duck hops up and down, blundering the sound track with belligerent squawks. Sitting on the edges of their seats in the darkened theatre, everyone from Grandma on down to Baby Daughter squeals with delight as Mickey Mouse and Pluto romp about in a burst of Technicolor hilarity.

Little do these delighted spectators realize that at the Walt Disney Studios in Burbank, California, 184 technicians

worked a total of 16,502 man-hours to turn out 14,907 separate paintings, in order that those nine minutes of animated laughter might appear on the screen.

The making of an animated cartoon is not a simple affair. It involves a series of precise, lengthy, and completely fascinating processes. The medium is, in itself, a happy marriage of art and science skillfully blended to create a unique form of screen entertainment.

By now, almost everyone knows the

basic theory behind the production of an animated cartoon. They know that a cartoon, like any other motion picture, consists of thousands of separate still pictures recorded consecutively on a narrow length of film—that each succeeding picture or frame records the action at a slightly more advanced stage—and that when these pictures are flashed on a screen at the rate of 24 per second an illusion of motion is produced. In cartoon production, each of these individual frames must be hand-drawn, painted, and separately photographed one after the other onto a strip of film.

It takes at least six months to turn out a one reel cartoon comedy. Full-length features like "Fantasia," "Song of the South," and "Pin and Fancy Feet," take upwards of two years. Putting one line of Donald Duck dialogue on film requires the combined efforts of a director, narrator, dialogue director, two recording engineers, five sound effects men, a story man, and a musical director. All in all, it is not as easy as rolling off a log.

"The Story's the Thing . . ."

The first step in the production of a cartoon is the selection of a story. For this purpose, the studio maintains a staff of story experts whose job it is to review existing stories, dream up original plots, and do detailed story research. Walt Disney very rarely buys an outside story, preferring to stick to plots originated in his own shop. Now and then, however, a book like Pinocchio or Dumbo catches his eye, and he buys a picture around it.

When an idea has been selected, it is made the subject of a story conference, during which it is "kicked around by a brace of idea men. These warblers sit around and let their imaginations play with the plot, while a secretary jots down the pearls of wisdom that drop from their lips.

Disney usually sits in on the first two or three story conferences. At succeeding meetings his men work up an outline of the story which goes to Disney for his O. K. As the story is discussed, ideas for gags and action begin to develop. At this confab some of the best acting in Hollywood goes unrecorded, as writers bound about the room acting out bits of action.

From these bull sessions, sketches are prepared to illustrate each step of the action. Characters (which may go through quite a process of evolution before being okayed) are designed to populate the story. The sketches are then arranged in sequence around the walls of a room in what is known as a story board. Each separate scene or change of action has



The photographing of a cartoon feature is a lengthy process; these each individual colored painting has to be photographed separately on top of its corresponding background. The operator must align each and carefully with an air base before exposing it.



The three main steps in the production of cartoon animation. (Left) An animator lays out a facial expression in the mirror, before translating it to the whimsical cartoon character he is drawing. This is the primary step in animation. (Center) The pencil drawings of the "roughs" are carefully traced onto the cels with ink. Skilled hands get artists doing highly scoring work. (Right) After inking, the separately outlined areas of the characters are painted according to a carefully worked-out color plan. (Source: manufacturers more than 2,000 separate shades of paint in his own laboratories)

its own speech, with dialogue written under the picture. Hundreds of these speeches covering the walls of a room give the effect of a giant page of comics. As story changes develop they are indicated on the story board. After considerable juggling about, the story is approved and actual art work can begin.

A director is assigned to each picture, and it is his task to follow the story through every phase of production, timing and co-ordinating all the elements that go to make up the finished picture: story, action, dialogue, sound and music. The picture is his "baby," and he is the one technician who follows the story through from beginning to end.

The Layout Man

The designing of every phase of the production is supervised by a layout man, who visualizes the overall graphic presentation of the story. He often works with the director in developing the original

plot—and he definitely has a hand in the construction of the final shooting script.

The layout man establishes the background, sets, characters, paths of action, perspectives and key positions. It is he who designs camera angles and movement, fitting the aesthetics of art to the mechanics of the camera.

If he finds that the story is particularly weak in one spot, he works with the writers and director to add more visual appeal to that sequence. He is not acutely concerned with sound and music, nor with the actual mechanics of the action. His main concern is to make sure that the story will look well on the screen.

The layout man breaks the story down into separate scenes and sequences, indicates where close-ups are to be cut in, decides what types of transitions (dissolves, wipes, etc.) will be used to tie the sequences together, and works out the details of camera movement. He devises spe-

cial effects and tricks, develops interesting patterns of light and shade, and indicates the colors which he feels will best set off the characters against the backgrounds.

Thus completed, he assigns separate phases of the art work to appropriate departments. His sketches of the proposed characters are sent to the Animation Department, where they will be developed in greater detail. His basic designs for backgrounds are sent to the Background Department, where they will be precisely laid out and painted. His suggestions on color scheme are given to a color specialist to be more precisely worked out.

The layout man and the director next collaborate on the writing of the *storying script*, which is made up of individual *exposure sheets* for each scene. The basic time unit of the exposure sheet is the *second* and every second is ruled off into 24

(Continued on Page 412)



(Left) A large portion of the preliminary work in designing a Disney picture is done by "layout men," known on the title credits as "art directors." The above artist is shown laying out a background. Layout men work with the director and design color lighting, backgrounds and effects, as well as establishing the perspective of the characters. (Right) A Walt Disney background artist is shown in the process of starting one of the drawings for a feature cartoon. Working with ink and watercolor, he forms real backgrounds for the animated action. Such paintings are often precise works of art worthy of museum display.

MOTION PICTURE ART DIRECTION

By HAL HERMAN

RED SKELTON'S antics as he sets out to charm the country's housewives in his portrayal of "The Fuller Brush Man," should provide theater-goers with a hefty ration of laughter.

His role of the dashing young fellow who is quick to put his best foot forward (before the door can be closed in his face,) is right down the fence's special avenue. As king of the clan of doorbell ringers, 'a brash salesman who just can't take a brush-off,' Skelton has a story tailored to his talents. During preparation for shooting the film, however, there arose many problems which, like Red himself, just couldn't be brushed off.

One of the early scenes in the picture shows Skelton racing up on the porch of a neat little cottage with his case of Fuller brushes, explains Carl Anderson, set director on the Columbia film. Right there we ran into a problem.

"In fact we discovered the problem and worked out the answer days before the cameras rolled on the first scene," he said. "The screen called for Skelton to ring the doorbell, and then see the lady of the house as she goes to answer the

telephone, mistakenly thinking that it was rung.

In the interest of the story, he explained, Les White, A. S. C., Director of Photography, and Sylvan Simon, producer-director, wanted to have the set constructed in such a way that the camera would be able to show Skelton impatiently ringing the doorbell, and also inside in the same scene, the lady inside the house as she moves around to answer the phone."

After a tussle with Simon and White, the art director re-designed the frame of the cottage so that a set of spacious bay windows came out at right angles from the front of the house, opening into a sort of sun room or den. Thus the camera lens could easily capture the comic implications as Red's impudence rises while he repeatedly rings the doorbell, and the lady, seen through the windows, by the audience (but not by Red) gets equally wrought up over the puzzle of which bell is ringing.

"This is a simple example of the way an art director can collaborate with the cameraman and permit him to tell the

story through more direct photographic interpretation, and with greater dramatic effect," Anderson said.

"It is neither fair nor reasonable," Anderson asserted, "to expect the cameraman to get more on the screen in the way of backgrounds than the art director has given him."

"Of course all cameramen operate differently," he declared, "but I've found that advance planning and interesting use of materials, of design, color, glass, wood and stone, lend much to the drama of photography."

"I also have a personal belief," Anderson said, "that the success of the art director depends to a great degree on his close cooperation with, and understanding of the cameraman's problems. For no set is any better than it is photographed. The best sets can be made to look good or bad personally."

"Constant meetings which permit joint planning between cameraman and art director so that each may know the desires and limitations of the other are imperative," he emphasized.

Anderson has a definite personal viewpoint concerning his work. He feels that sets are designed and created to help establish the mood of the story, while at the same time blending with, and yielding to the requirements of the camera in space, angles, lighting problems, occurrence of materials and colors, and of course the movement of the players as required in telling the story.

One of the main sets erected at Columbia for the Skelton comedy, "The Fuller Brush Man," was conceived and entirely built around the opening shot in the sequence.

The set was perfectly round, low and quite large. The scene opens on a medium



The arches dramatic mood of "The Sign of the Cross" was accentuated by the art director's subdued design of the living room with low beamed ceiling for a home on the English coast (left). On right is one of the 28 open-sided sets constructed on a single stage for the elaborate thematic dance sequences by Rita Hayworth, Larry Parks and Muriel Platt in Columbia's Technicolor musical, "Queen Is South." The open-sided sets in action allowed the dancers to progress from one to the other while being photographed continuously from a travelling camera crane.

close shot of two brush salesmen sitting on a circular dais and rubbing their aching feet. The camera pans up to show a large, transparent globe with its map of the world, then dollys back to a long shot of the room which carries out the round curving lines of the globe.

"The problem here," Anderson said, "was to make some sort of ceiling piece which could gobos out the lights around the top of the set (which was extremely low) and yet fit into the design of the room. While carrying out the rounded lines of the set, it acts as a sort of combination 'filon-gobo' which cuts down the illumination, masks out the lights around the top of the set, still allowing enough to come through to study cameraman Les White. All departments cooperated in effecting this job. The result is striking and effective," Anderson says enthusiastically.

Use of scale models of sets in conferences held prior to the start of shooting, too, is the opinion of Rudolph Sernad, veteran Columbia set director, of the highest importance.

"I consider models the greatest source of collaboration between art director and Director of Photography, as well as with the director, the electrical crew and every other department concerned with preparing and shooting the film," Sernad declared. "Furthermore, I have found these models of greater value to the cameraman than they are even to the director. I mean because of the physical setup for planning camera angles, for working out the lighting effects and for covering the action of the scene planned for that set."

"Actually, I am more concerned with getting the clay of the cameraman on a given set than I am with the approval of the director, even though the models are also a great help to the director," Sernad asserted.

By way of illustrating the practical value of miniature models of sets, Sernad described his work with Rudy Mate, A. S. C., in cooperating on plans for the lavish New York musical number in Columbia's "Down to Earth," currently released.

"This big musical number called for twenty different sets. All had to be built on one single stage, and opening one into the other," he explained. "This arrangement was required to permit Rudy Hayworth, Larry Parks and Marc Platt to go through their dance routines while moving progressively through the different sets without interruption."

"By using a master model of the whole set, and having small models of the individual actions which could be moved in and out, Rudy Mate and I, along with

the dance director, Jack Cole, and the gaffer, shot that whole musical sequence before the sets were built."

As a further illustration of the use of models on that same production, Sernad cited a sequence in which Mae Hayworth as Terpsichore, goddess of the dance, walks on clouds among fluted columns which, in perspective, fade away into the distance.

After shooting the sequence with Mae Hayworth alone, the art director explained, "we wanted to move a huge, stylized airplane to the same cloud covered area without having to tear down the whole set. This was shot at the Sonja Henie Ice Palace in Westwood. We arranged to swing the airplane on an angle up into the grandstand. Then, after finishing with the column routine we could clear space for the plane to be moved into position for shooting."

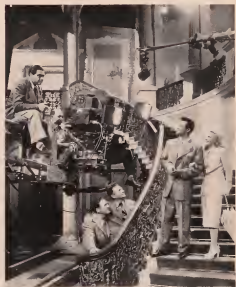
"All the action for these sequences," Sernad said, "was planned and worked

out with Rudy Mate, Director Al Hall, the electrical department and myself in advance of our taking the company out to the location. We got exactly what we wanted with a minimum of delay and expense. Those models were worth their weight in platinum."

An authentic and luxurious Park Avenue drawing room, that literally breathed "Social Register," was needed for key scenes in the Columbia picture, "It Had to Be You." The drawing room was to be the setting for several fashionable weddings for Ginger Rogers.

Here again the models were of great value to Vincent Farrar, A. S. C., and Director Don Hartman, as well as myself," Sernad said. "We wanted a grand mansion suitable for a swanky wedding with two or three hundred guests filling, but not crowding the drawing room. It had

(Continued on Page 418)



Two story drawing room especially created by art director Rudolph Sernad to accommodate script action for "It Had to Be You."

HISTORICAL DEVELOPMENT OF SOUND FILMS

By EARL I. SPONABLE

(Twentieth Century-Fox Film Corp., New York)

PART 5

(Editor's Note: This most informative paper was presented by the author at the October, 1946 convention of the Society of Motion Picture Engineers in Hollywood, and published in the May 1947 issue of the SMPPE Journal. It is reprinted through permission of the SMPPE.)

(Continued from Last Issue)

1925-'26. Major development of the disk system of sound motion pictures, later trade-named "Vitaphone" was carried out by a group in the Bell Telephone Laboratories headed by Dr. J. P. Maxfield. At about the same time, another group headed by Dr. Cundell and Dr. MacKenzie were working out a sound-on-film system using a "light valve" designed by Dr. Weste in the recording.

Apr. 20, 1925. Western Electric Company entered into a contract with Warner Brothers and W. J. Rich, a financier, giving them an exclusive license for recording and reproducing sound pictures under the Western Electric system. The Vitaphone Company was formed.

June 1926. The Vitaphone Company opened a recording studio at the Old Manhattan Opera House 54th Street, New York.

Aug. 6, 1926. Warner Brothers gave their first public performance of Vitaphone at the Warner Theater, New York, showing a sound picture, "Don Juan," and several shorts including a talk by Will Hays, and songs by Marnett, Marian Talley, and others. This received favorable comment from some papers, enthusiastic comment from others, and grave doubts from the industry that talking pictures would ever be commercial.

Dec., 1926. The Vitaphone corporation gave Fox a sublicense to use Western Electric equipment in the field of sound pictures.

Dec. 31, 1926. Western Electric had equipped about twelve theaters with sound installations for Vitaphone.

Jan. 1, 1927. Electrical Research Products, Inc. (ERPI) was formed as a subsidiary of Western Electric and AT&T to commercialize equipment for the sound motion picture field, the equipment business having been bought back from the Vitaphone Company. The name Vitaphone was retained by Warner Brothers for their sound picture system.

Spring, 1927. Vitaphone recording was moved to Hollywood.

Feb. 28, 1927. MGM, First National, Paramount, Universal, and PDC, named "The Big Five," agreed to stand together for the purpose of determining the right sound system and used the facilities of the Hays organization for this investigation.

Apr.-Aug., 1927. ERPI made their first light-valve installation in the Fox Movietone studio at 54th Street and 10th Avenue, New York. This was installed at ERPI's expense and operated experimentally by Bell Telephone Laboratory engineers. The ERPI film processing specifications were rigid and their technique of operation was not sufficiently advanced to impress the Fox group that the light-valve system offered any commercial improvement over the Case system then in use.

Apr. 19, 1927. Warners secured 100 per cent ownership in Vitaphone by purchase of W. J. Rich's interests.

Oct. 1927. Warners released *The Jazz Singer*. This is spoken of as the turning point in the coming of sound, and served to convince the industry of its possibilities.

Dec. 31, 1927. One hundred and fifty-seven theaters were equipped for sound, of which fifty-five included film units. The rest were disk only.

Apr.-May, 1928. ERPI contracts were signed by the Big Five group. This ensured the general use of talking pictures. The Warner contract was revised when ERPI took over the equipment business and a new Fox license was also signed about this time. Victor and First National announced the release of their product under the name of "Fonotone." The ERPI licenses granted during this period included the following companies: Paramount, United Artists, Metro-Goldwyn-Mayer, First National, Universal, Christie, Hal Roach, and Victor Talking Machine Company.

May-Dec., 1928. There was great activity in getting studios equipped for recording. Everyone wanted to learn at once and equipment was at a premium, with deliveries most indefinite.

At about this time, sound equipment and recordings were standardized to a

sufficient extent that apparatus made by either RCA or ERPI could satisfactorily play the product made with the other equipment. In the beginning, ERPI tried to restrict the use of its equipment to sound tracks made on the Western Electric system.

July, 1928. Paramount began recording in Hollywood on a temporary channel and first used sound in their picture, *Warning Up*, with Richard Dix.

July Sept., 1928. Their first all-talking picture was "Inferno," directed by Roy Pomeroy. This was followed by "The Doctors Secret" and others. During this early work in a temporary studio, many of the scenes were made at night to avoid outside noises.

Dec. 1928. Paramount began recording in its new sound studios on regular channels.

Dec. 31, 1928. ERPI had 1046 theaters wired for sound, of which 1052 were for sound-on-film.

Jan. 1929. Warner Brothers became interested in the Patent sound system and approved Patent installations in April, 1929. ERPI began suit against Patent for patent infringement.

Aug. 3, 1929. The first issue of *Paramount Sound News* was released.

Dec. 31, 1929. The tremendous growth of the sound motion picture business in a little over two years is evidenced by the fact that there were 77 ERPI recording channels in operation in the United States. ERPI also had equipped about 4900 theaters in this country and some 1200 in Europe. Most of the theater installations were for both sound-on-film and sound-on-disk.

Also at this time it became evident that there was a trend to favor sound-on-film over sound-on-disk for theater release purposes.

Apr. 1930. Warner Brothers announced the purchase of an interest in the T. H. Naiken patents. These patents related to the use of a photoelectric cell and an amplifier. (Subsequently they were used as a basis for litigation.)

Sound Work Under the RCA System

1925-'26. About this time, a small group of engineers at Schenectady, headed by C. A. House, experimented on recording sound on film photographically, using a special oscillograph as the recording unit and making records of the variable-area type. This sound-on-film system was called the "Polyphorphone." Also at this time, Hewlett (a research engineer in the General Electric laboratory) was perfecting his induction-type loudspeakers, and Rice and Kellogg (also General Electric research men) were developing their electro-dynamic cone speakers.

Feb. 1927. During the year 1926,

(Continued on Page 415)

What's the name
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(For Semi-Professional and Amateur Production)

17. Sound Cutting and Recording

By CHARLES LORING

IN an earlier chapter we discussed motion picture sound in terms of its role as a dramatic element applied to the visual image. We are now ready to take up some of the mechanics of sound cutting and recording, examining the more technical phases which would be of interest only to someone specializing in sound engineering.

In order to discuss the subject intelligently, we must first define certain fundamental terms that are used constantly in recording.

There are two standard types of recorded sound track: *variable area* and *variable density*. The *variable area* track has a split pattern of opaque black and clear white which varies in width according to the modulations of the recorded sound. The *variable density* track is composed of a continuous band of minute striations which vary in density according to the modulations of the sound.

Individual producers have their own preferences as to which type of track is best. It is generally agreed, however, that for 16 mm. production, *variable area* track gives a clearer rendition of the sound, and is also less likely to be adversely affected by improper development.

Direct sound refers to that which is recorded in synchronization as the action is shot—so that the dialogue of the actors for instance, is perfectly matched to their lip movements.

Narrated Track refers to commentary which is not closely synchronized with the action when it is shot, but which is "dubbed in" later and delivered off-screen" by a narrator describing the action.

Wild Track refers to dialogue or sound effects recorded independently of the action, and later cut to fit.

Pre-recorded Sound is that which is recorded beforehand (either on disc or film) and then "played back" on the set so that the actors can match their action to it. Musical numbers are usually handled in this way.

Post recorded Sound refers to dialogue synchronized with silent footage that has been shot previously and cut into continuity. The actors watch the film as it

is projected in the sound booth, and speak their lines to match the lip movements on the screen.

Single channel Sound or "radio type" recording, is a process in which narration, music and sound effects are all recorded through the same microphone, onto a single strip of film, at the same time.

Multiple-channel Sound is a process in which narration, music and sound effects are each recorded separately onto film or discs. Each of these is channelled separately through a central control board, and can be blended or mixed, on a monitoring console to achieve precisely the right balance.

Types of Recording Equipment

There are two general kinds of sound recording systems: *single system* and *double system*. *Single system* sound is that which is recorded right in the camera onto the same strip of film which is being used to expose the picture. This type of equipment has the single advantage of being relatively portable, since no separate recorder is needed. It has, however, certain marked disadvantages—mainly the fact that while the sound and picture are recorded onto the same strip of film, they are recorded out of sync." This means that in order to get them to synchronize, it is necessary to make a duplicate negative of the sound track and match it up with the picture negative in printing. A certain amount of sound quality is invariably lost in this process.

Another disadvantage of *single system* sound is that the sound must be recorded onto whatever type of film stock you may be using to expose your picture. A special slow speed, fine grain film is necessary for really fine sound recording, and the ordinary fast emulsions used in modern cinematography are too grainy to render really good sound fidelity. This means that if you are using an ultra-fast film to expose your picture, the sound recorded on that film will be of a relatively poor quality.

Double system sound, which is the type used in professional photography production, is based upon three separate mechanisms: the camera, the synchronous motor and the recorder. The synchronous motor

serves to "lock" the mechanisms of the camera and the recorder in synchronization so that they run at exactly the same rate of speed, thus keeping the sound matched frame-for-frame with the picture.

In *double system* recording, two separate strips of film are used, one as the camera and one in the recorder. This means that you can use whatever emulsion you wish, fast or slow, in your camera—and at the same time get a fine quality of sound by using fine-grain sound recording stock in your recorder.

On the set, the initial synchronization for each scene is made by snapping a clap-board three in front of the lens, after the camera and recorder have reached proper recording speed. The frame on which the two blades of the clap-board meet serves as the "sync mark" for the visual footage. A sharp, easily-recognized mark on the sound track (caused by the sharp click of the clap-board) serves as the reference point for syncing the sound. When these two marks are later lined up in the cutting room, the sound and the picture are sure to be "in sync."

Besides sound-on-film recorders, there are several other devices which may be used for recording. These include disc, tape and wire recorders. All of these machines are especially good for recording sound effects on location where it would be impractical to transport heavier sound-on-film equipment. In order to use them for recording *direct sound*, however, the recording mechanism must be carefully interlocked with the camera by means of a synchronous motor, and a similar arrangement used when the sound is re-recorded onto film.

Recently perfected wire and tape recorders have certain advantages over disc recordings. They do not develop surface noise—and the sound can be edited, just as when it is recorded on film. The tape recorder has a wider frequency range than the wire machine, and therefore greater fidelity.

Working With Narrated Sound

A great majority of commercial, educational and documentary films employ *narrated sound* rather than *direct dialogue*, the main advantage being that narration is much less expensive than *direct sound*, because it eliminates the necessity of having bulky equipment and a trained sound engineer available on location while the picture is being shot.

From a dramatic standpoint, narration can be more objective at times than *direct sound*, since it can "stand off" from the situation and present facts that would take a great deal of dialogue to explain. Good narration is always to be preferred over second-rate *direct sound* if it has a definite versatility, and is sometimes very effective when written in the first person

singular. Its force depends upon how well it is written and cued.

Narration should be planned to complement the visual image, rather than repeat exactly what is shown on the screen. A film should never be packed solid with narration. Leave spaces for audience reaction so that the ideas will have time to register fully. Such gaps in narration can be effectively filled in re-recording by bringing up the volume of the background music at that point.

In timing your narration to your footage, allow approximately 3 words per foot, if the commentary is to be read at normal speed. Before going into the actual recording session, project the film several times and read the narration along with it, taking note of any places where the commentary does not correctly jibe with the visual image. Also, notice at which point in each scene you must begin your block of narration in order that it will closely fit the action and not run over into the following scene.

Having gotten the "feel" of the narration, you will be ready to cue the narrator during the recording session. Divide your commentary into separate blocks and hand a marked script to the narrator. You will cue him in on each block by means of a hand signal. Record one reel at a time, rehearsing it well beforehand so that the

narrator can get the sense and tempo of it.

Recording the Master Track

In single-channel recording—narration, music and sound effects are all recorded simultaneously, just as in a radio broadcast. Each separate element is cued by the director or one of his assistants. The sound effects man will produce his noises on cue, and the man at the microphones will bring up or fade down his music in response to hand signals from the director.

While this system of recording is quite a bit less expensive than the multiple-channel variety, it also leaves less margin for error—since the whole reel must be recorded over again should there be a mistake in cueing any one of the separate sound elements.

In multiple channel recording, a different sound channel is used for each separate element of sound, all of these various channels being correctly blended together on a monitoring board by the sound mixer. There will usually be two music tracks (cut into A and B rolls so that themes can be faded one into the other). There may also be one or more sound effects tracks, with the effects cut to precisely match the action. These separate sound-on-film tracks are run in synchronization through sound reproducing

devices called film phonographs, which are channeled through the central control board. Additional music or special sound effects can be run on discs and similarly channeled.

In the making of the master track, each sound channel is represented by a separate dial on the mixer's console. The narrator's voice (recorded directly onto the master track for greater fidelity) is assigned a recording level, and all of the other sound elements are keyed to favor that level. In actual recording, the mixer will bring up his music level to fill gaps where a block of narration ends, and will fade the music down again as the next block of narration is cued in.

Music and Sound Effects

Suitable background music adds greatly to the effectiveness of a motion picture. Select music to closely complement your various sequences, but do not allow the music to overwhelm either the dialogue or the action.

The re-recording of published disc music onto film is a rather ticklish proposition, due to the fact that copyright laws and union restrictions closely limit such recording. Be sure that you have specific written permission from all parties concerned before you dub music off of discs. There are a few services that

(Continued on Page 408)

Professional Type Combination SUNSHADE and FILTER HOLDER



The Sunshade-Filter Holder is supported by a double arm bracket. This attaches to a plate which you can fix on to the base of your camera where it can remain at all times if you desire. The Sunshade-Filter Holder is demountable into 3 small units which, when not being used, fit into your camera carrying case.

Manufactured exclusively by the makers of "Professional Junior" Tripods and other fine camera accessories.

For E. K. Cine-Special, Bolex, Film and other fine 16mm cameras. It resembles the professional 35mm type Sunshade-Filter Holders and Matte Box generally used with professional 35mm cameras.

Designed for use with all popular types of 16mm cameras, the "Professional Junior" Sunshade and Filter Holder holds two 2" square glass filters, also a 2½" round Polar Screen with handle which can be rotated for correct polarization. By using our Sunshade and Filter Holder you will not require filters of various sizes as the 2" square filter will cover all lenses from 15mm to 6" telephoto.



Compact, simple to assemble or dismount, the entire Sunshade-Filter Holder and 2 filter holders which are supplied are precision-made of non-corroding metals. Every serious cameraman appreciates the advantages that accrue when a fine Sunshade-Filter Holder like this is used.

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AMONG THE MOVIE CLUBS

Los Angeles Cinema

Program of slides taken by Major R. K. Leslie during an assignment at Trent, Italy, comprising interiors and exteriors of famous architectural achievements—together with great artistic masterpieces—featured the October 6th meeting of Los Angeles Cinema Club, held at the Bell Club. Dr. Leslie Stuart also showed his "Trails Through the Tropics," his personally-produced traveling through Jamaica, Haiti, and the Bahamas. Mrs. Leslie narrated the slides, while Dr. Leslie gave running commentary on his film.

An anonymous member of the club has donated \$100 to be used for prizes in the club's annual contest, which closes on November 20th. Contest Chairman James H. Mitchell announces that contest will have two separate classifications—silent and sound sections.

Milwaukee Amateur

Film program for the October 8th meeting of Amateur Movie Society of Milwaukee, held at the Red Arrow Club, was provided by Metro Movie Club of Chicago, with subjects including: "Sunday Morning," by Stanley Yaskin; "Black Widow," by Carl Frazer; and "Flying South," by Arthur Elliott. Special judges and riding held the stage at the meeting of October 22nd.

Prizes entered in the club's annual film contest for both 8 and 16 mm. will be exhibited at the meetings of November 12th and 26th. Contest committee comprises Mrs. Agnes Muehlbach, Roy C. Fahrenberg, and Mrs. Gertrude Milster.

New York Eight

Due to financial problems arising from necessity of paying rent for meeting room, members of New York Eight MM Motion Picture Club voted unanimously for dues of five dollars annually and to reduce number of meetings a year to 10. An opening committee of six was appointed to handle the future business affairs of the organization. Film program at the October 15th meeting comprised "Grange Quarry," by Harry Jewell of Alhambra; "Pilgrimage to Oriskany," by Fred Furman.

Utah Cine Arts

Members of Utah Cine Arts Club provided the film program for the October 15th meeting, held at Newhouse Hotel, with a number of 50 foot rolls exhibited. Surprise film to launch the meeting was supplied by president Theo Merrill, and technical session was presided over by Merrill, LeRoy Hansen and Al Milton.

Washington Cinematographers

Initial meeting of the new season for Washington Society of Amateur Cinematographers was held in auditorium of Review and Herald Publishing Co., Takoma Park, on September 15th. Officers elected for the coming year include William C. Kuhl, president, Harold K. Wagner, vice president, Wilbur F. Comings, recording secretary, J. Donald Sutherland, corresponding secretary, Theodore H. Sarchin, treasurer, and Charles H. Ward, chairman, publicity committee. Film program for the evening displayed "Come to Come" and "Union Pacific and the Grand Canyon."

San Francisco Cinema

At the October 21st meeting of Cinema Club of San Francisco, held at Women's City Club, a fine selection of films were exhibited, including "My Carle Ranch Vacation," by member Fred Youngberg, "Canada's Tacklebusters," through courtesy of Canadian Pacific, "History of Lighter Than Air Rigid Ships," loaned by the U. S. Navy, and "Our Western Wonderland," series of kodachrome slides by C. D. Hudson.

Philadelphia Cinema

A. R. Nichols, program chairman, presented a splendid group of films for the October 14th meeting of Philadelphia Cinema Club held at Franklin Institute, including "Mackerel Expedition," by Harry Taylor, "The River," documentary through courtesy of Bob Hamner, "How Leases Are Covered," by courtesy of Acta Instruments, and "Sightseeing at Home," presented by General Electric Company.

Los Angeles Eight

Larry Zeman was master of ceremonies for the annual Pur President's Night of the Los Angeles Eight MM Club, which was held at Arden Fanny Clubhouse on October 14th. Meeting brought out a big attendance of former officers, and film program comprised a number of the outstanding films produced by members in prior years. Club bulletin announced that current president, J. R. Hornaday, has left for a permanent position in Erie, Pa.

Alhambra La Casa

Mr. and Mrs. McHenry were honored on their 50th wedding anniversary at the October 20th meeting of La Casa Movie Club of Alhambra, California, held at the YMCA building. For the film program, Dr. Leslie A. Stuart exhibited his "Trails Through the Tropics" taken during his recent trip to the West Indies.

Brooklyn Amateur

Initial guest night of the new season was held by Brooklyn Amateur Cine Club at the Neighborhood Club auditorium on October 15th, with film program comprising "Onset of Spring," by John Larson, "Cheated," by Herbert Esler, "World's Fair," by Francis Sidiore, "Vacation in Connecticut," by Charles Benjamin, "Life of a Fireman," by Harold Cahn, and "Vacation With Pay," by Irving Ginnell.

Gene Adams presented a lecture and demonstration on the subject of lenses at the October 1st meeting, followed by exhibition of "Lenses and Their Uses," through courtesy of Harmon Foundation. Club members won two first and six second prizes in the film contest of the Minicell Fair so take major honors in the event.

San Francisco Westwood

Gadget Night held attention of members and guests of Westwood Movie Club of San Francisco at the September 26th meeting held in St. Francis Community Hall. Event brought out many favorite gadgets and pieces of apparatus—both home-made and standard brands—thus members feel make better movies.

Film program for the August meeting included "Super Salesman," by J. M. Rugh of Long Beach Movie Club, "Diaper Diary," by Lee Bustin of Peninsula Movie Club, and "Indiana Washday and Coklahoma Washday," by Dr. Seewie of Indianapolis Movie Club.

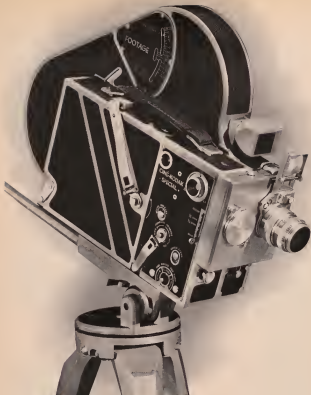
Saint Louis Amateur

Regular monthly meeting of the Amateur Motion Picture Club of St. Louis was held on September 9th at the Roosevelt hotel. Neil Buttger screened his 16 mm. kodachrome film, "University City Track Meet," and Frank Gonnell's "Blue St. Paul" was shown through courtesy of Amateur Cinema League.

Judges handed first prize for the best club picnic film to Ralph Meteka, with Martin Masoville placing second.

Tri-City Cinema

September 18th meeting of Tri-City Cinema Club (Rock Island, Ill. Moline, Ill., Davenport, Iowa) was held in Davenport, at which time Cliff Hyland of General Electric Company, Cleveland, presented "The Family Album," and presented a most informative talk on triangle lighting. The club alternates meetings between the three cities, and annual banquet will take place in Rock Island in December.



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Ciné-Kodak Special cameras today than ever before. We wish, as you do, that our production could match strides with the demand. But the importance of this fine camera to the growing fields of personal, educational, industrial, and entertainment movies has overtaxed the output facilities for a product that permits no short cuts.

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BLUE SEAL CINE DEVICES 35MM. SOUND RECORDER

A COMPLETE new line of 35 mm sound-on-film recording equipment is announced by Blue Seal Cine Devices, Inc. of Long Island City by president J. Burg Coatsworth. Three different types of equipment are included: the portable type, the studio-location recording equipment, and the de luxe studio recorder. Recording cameras are the same in each instance, but the amplifier equipment is of different design for each of the models. The recording equipment is de-

scribed in detail as follows by Mr. Coatsworth:

The Recorder is of modern streamlined design. The motor and galvanometer are entirely enclosed in the housing. The sound is recorded upon a rotary drum connected with a special damped stabilizer. Flucter control is less than 0.07%.

The galvanometer records a dual symmetrical variable area track. The optical system uses color corrected achromatic lenses which are coated. There is a total absence of flare or spill light. The impedance of the galvanometer is 50 ohms and the approximate level required for 100% modulation is ± 30 db. Galvanometer is tuned at 11,000 cycles, and has a flat frequency response. Noise reduction is obtained by beating the galvanometer.

Portable Recording Amplifier

The Blue Seal recording amplifier system has been designed for compactness, light weight, and for maximum flexibility of operation. This system is constructed as a single unit, containing a high quality amplifier with ample output to modulate the recording galvanometer 100%, with less than 2 db total distortion. Incorporated in this same unit is also a direct current amplifier for supplying bias to the galvanometer. The input signal for the bias amplifier is obtained from the output of recording amplifier which has a pre-equalizing circuit to compensate for the film recording losses, therefore no further frequency correction is necessary in the noise reduction circuit. Signal limiting system, consisting of a diode rectifier and adjustable threshold control has also been added for the protection of the galvanometer when recording high amplitude sound such as gun shots, etc. For purposes of determining recording level and bias margin, a thousand cycle oscillator has been included, and may be inserted or removed from the system circuit by means of the switch mounted on the control cabinet.

The power supply is of the same type as furnished with the de luxe recording system, with the exception that it is contained in a separate portable field type carrying case. This system also includes a metering circuit, by means of which all circuits may be checked as to performance. Amplifier specifications—2 microphone input positions, input impedance,



Blue Seal de luxe model studio type mixer, with four mikes, VU meter, damping equipment, and low and high pass filters.



Standard model portable recording amplifier.



35 mm. sound-on-film recorder with variable area galvanometer, color corrected optical system, and rotary stabilizer.



Amplifier cabinet for De Luxe Recorder

50 ohms balanced ladder controls on each position plus balanced T master control following the pre-amplifier stages, total gain of the system 120 d b. Maximum output is -50 d b at 1% distortion. Distortion at 100% recording level (+20 d b) equals 2 of 1%. Minimum input level -90, maximum input level -45 d b. Hum level -85 d b below zero decibels.

De-luxe studio and location recording amplifier, consisting of two units, a portable extension mixer, containing microphone pre-amplifiers, balanced gain controls feeding into a self contained line amplifier to the main recording amplifier. Two input positions are supplied for 50 ohm microphones, each input position also has in-and-out switches to avoid possibility of input leakage. Provisions are also made in the portable mixer for metering circuit components, and 100% circuit performance are indicated in the mid scale of the VU meter. Current and voltage for the mixer is obtained from the main regulated power supply.

Minimum input level to the mixer is -90 d b, maximum input -40 d b. Maximum output level from the mixer to the main recording amplifier is -20 d b. Total over all gain of mixer is 40 d b. Recording amplifiers furnished with the de-luxe systems are of the compression type. A master gain control is located on the front panel of the main recording amplifier and establishes the required output level from the main recording amplifier to the recording galvanometer. Compression threshold is adjustable by means of a control on the front panel and compression range is approximately four to one. Also contained in the main amplifier is a noise reduction unit for providing bias for the galvanometer. A rhomboid cycle oscillator has been included to facilitate adjusting 100% modulation of the galvanometer and margin for the biasing system. Maximum output level of the amplifier is +30 d b as measured by using 006 watts as a reference level.

A monitoring circuit is provided and access to this circuit is by means of a jack on the front panel and is also available at a jack on the mixer cabinet. Metering circuits are also included in the main amplifier, so that by means of selective switching, all circuits of the main amplifier may be checked for 100% performance. Output impedance of the main amplifier and the recording galvanometer is necessary. The total over all gain of the main amplifier is 70 d b. The main amplifier is mounted in a rack type cabinet with a voltage regulator power supply from which it obtains its voltage and current.

Voltage Regulated Power Supply

The voltage regulated power supply is capable of supplying 250-325 volts D.C. at 200 milliamperes 6.3 volts A.C. at 10

amperes and 6.3 volts D.C. at 2 amperes. The high voltage output variation in the operating range is + or - 1%. The ripple factor at maximum output is 10 millivolts.

De-Luxe Studio Equipment

The de-luxe studio equipment is furnished with a console type mixer with 4 mixers and one master gain control. Two types of plug-in pre-amplifiers are supplied for the console mixer. Type (A) low impedance input for microphone, Type (B), Photo cell input for re-recording. Dialogue equalizers are provided on each mixer channel. These can be inserted or cut out by the use of key switches. Also, high and low pass filters are incorporated in the mixer. These are also controlled with in and out keys. Mixer console is coupled to main amplifier through the use of high and low level cables. Main amplifier cabinet houses the main recording amplifier, compression amplifiers, noise reduction amplifier, monitor amplifier, voltage regulated power supply and a distribution panel. All the equipment is finished in an attractive gray wrinkle paint.

Blue Seal also is manufacturing a complete line of re-recorders, Selenium Exposure Lamp and Racner Lamp Recorders, Re-recording equalizers and Double Film Attachments with a jumping attachment, making it possible to run separate track and picture and 150 foot continuous loops for dubbing purposes.

Promotions in Kodak Research Lab

Dr. Cyril J. Saul has been appointed director of Kodak Research Laboratory, according to announcement by Dr. C. E. K. Mees, founder and director of the laboratories since 1912, who will continue to serve as Kodak vice-president in charge of research.

Dr. John A. Termonen was named assistant director and head of the photographic theory department, while other appointments included Samuel W. Darnbush, formerly administrative assistant to the director, as business manager of the laboratories, Dr. Walter Clark, formerly technical assistant to the director, to head the black-and-white photography department, Dr. W. O. Koenig, formerly industrial superintendent of organic research department, to head the high polymer department, and Dr. H. C. Yarn, formerly assistant superintendent of chemical research, to head the emulsion research department.

Victor Promotes Executives

Lincoln V. Barrows, general sales manager of Victor Animatograph Corporation, was recently named a vice president of the company. At the same time, it was announced that Eldon Imhoff was promoted to post of domestic sales manager.

LEONARD SMITH, A.S.C.

Leonard Smith, A.S.C., who passed away suddenly on October 20th from a heart attack, was one of the most popular and esteemed members of the Hollywood motion picture colony. Although in ill health for the past two years as a result of a food poisoning attack while on location, he had shown great improvement and expected to resume work shortly.

As a member of the board of governors of the American Society of Cinematographers for a number of years, and in president for the four years of 1943-1946, he was a great force and made most substantial contributions to the present growth and position of the Society.

His friendly and humanitarian interest in all matters pertaining to his fellow cameramen placed him high in the esteem of the entire membership of the Society; while his sincere interest in all persons connected with the industry gained him countless friends.

Born and educated in Brooklyn, N. Y., and later attending Rutgers University, Len Smith was an athletic enthusiast, and—while still in his "teen"—played professional baseball. Motion pictures intrigued him, and he went to work in the Vitaphone laboratory in 1911. Within a short time, he became a camera assistant, and 15 months later was promoted to post of first cameraman. He photographed many of the early features at Vitaphone, spent two years with the American forces overseas in World War I, and came to Hollywood for Vitaphone. Shortly after he joined Educational, then moved to Metro-Goldwyn-Mayer where he was under contract for the past 20 years.

As Director of Photography at M-G-M, he photographed many important productions, and for the past decade handled a number of Technicolor features, several of which were nominated for annual Academy Awards. He felt that "National Velvet," a finalist in 1945 for Academy honors, was one of his best efforts. Last year, he received Award for Best Cinematography in association with Charles Rosher, A.S.C., and Arthur Arling, A.S.C. for best color photography on "The Yearling." Smith was one of the first Directors of Photography to use Technicolor monochrome on actual production, and shot all exterior on "Little Come Home" for technical exposure use of that type of color film on a studio feature.

His widespread popularity among all classes of studio workers was demonstrated by the overflowing numbers that paid tribute to him at the services conducted by Dr. William E. Roberts on October 20th. Among the A.S.C. officers and members who acted as honorary pallbearers were: John Arnold, Charles C. Clarke, Arthur Edwards, Harry Stradling, Sol Halsten, Ed Felts, and Charles Salerno. He is survived by his widow, and one brother.

Akers Professional Conversion for the 16mm. Bolex Camera

By WILLIAM C. THOMPSON

Especially designed for professional cameramen and existing amateurs who seek the most advanced equipment at minimum cost, the Akers Photo Engineering Company, Hollywood, has recently put on the market a new side-over conversion of the standard 16-16 Bolex camera.

This conversion is a professional engineering job and includes a rack-over, direct-view of field, motor drive, 400 foot magazines, many other practical innovations and improvements, and was engineered by Irving W. Akers, the designer of the Akers Featherweight 35 mm. hand camera.

The first working models have undergone thorough tests, and have proven satisfactory under all possible working conditions. Models are now in production and are available.

Among the salient features of this conversion are:

QUICK RACK-OVER This is comparable to that of the standard 35 mm. professional camera and enables the operator to see the actual lens image on the ground glass, right side up and correct from left to right. Because of the high-powered optical system used, magnification of 16 power is achieved, permitting extremely critical focussing over the entire field of vision included in the aperture. There are no moving parts, but the eyepiece of the scope is adjustable to the eyepiece of the operator.

400 FT. MAGAZINE Full shooting capacity has been assured by adapting the camera to use the Akers 100 ft. magazine, thus affording eleven minutes of shooting at sound speed of 24 frames, and 16 minutes at 16 frames per second.

Ordinary 59 and 100 ft. spool stock, however, can still be used in the converted camera by the simple operation of removing the magazine and substituting the blanking plate. Spool stock can also be loaded in the magazine without danger of fogging more than one foot of film that is exposed in the mechanism itself.

This 400 ft. magazine is so designed that the film lies against a metal flange mounted on a ball-bearing spindle that revolves with the film roll as it is used. Static electricity is avoided by this pro-

cedure, and the elimination of friction and rubbing on the edges lessens the possibility of the film being thrown out of alignment.

Easy threading is made possible by stainless steel rollers that are used as light traps and so spaced to make performance of this operation accessible. Scratches from hair and dirt, or hairs in the aperture, (inevitable when using cloth lined magazines) are rendered impossible by using no cloth either in the magazine itself, the covers, or the light traps. This feature also makes cleaning the magazine by compressed air feasible.

MOTOR The motor on this conversion is a 24-volt (AC-DC) model which can be operated on a light-weight 24-volt aircraft storage battery for location work. This type of battery will operate the camera motor long enough to expose 10,000 feet before recharging becomes necessary, and this can be done overnight on a trickle charger, or in a few minutes by the quick charge method available in most service stations.

Where power is available, the motor will operate on 110 volt A.C. current by means of an inexpensive transformer.

Motor speed is regulated by a con-

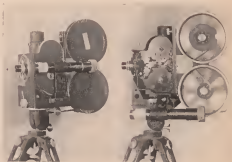
tact-type electric governor which gives absolute control of revolutions per minute and frames per second speed. Identical with the electric governor used in the Norden Bomb Sight, it affords speeds ranging from 16 to 32 frames per second, and is controlled by the mechanical governor in the camera itself. For extreme ranges, the electrical governor cuts out with a selective switch, and the speed is then regulated by a rheostat.

Switches for stopping and reversing and reversing are built-in features. Reverse switch is far enough away from the starting switch to prevent error in hitting the wrong switch while the camera is in operation. When buckling or mechanical breakdown causes a sudden overload, the electrical circuit is broken by a standard temperature fuse that is easily observable in any hardware store.

A synchronous sound (110 volt, A.C.) motor can be used instead of the above, if desired.

SPRING DRIVE The original spring drive of the camera can be used when operating with spool stock inside the camera. In the event of a mechanical breakdown this is an indispensable feature.

(Continued on Page 409)



On left, the Akers conversion of 16 mm Bolex; and (right) open to show movement and magazine.



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TRIPLE 8 PAN FILM

Cinema Workshop

(Continued from Page 401)

offer original music recorded on film and copyright-free to the subscriber.

You should, however, have no trouble in recording by means of orchestras or solo instrument music specially written for your film, provided that you have the composer's written permission to use his score. The one disadvantage of this type of scoring is its prohibitive cost.

There are several methods of musical recording, and we shall deal first with the procedure used by a "live" orchestra in recording a specially written score. The composer will have timed and co-ordinated his score to the picture. In the recording of such music, the film is projected from a sound-proof booth through glass and onto a screen in the recording studio. The conductor keeps an eye on the screen and the other on the score, and cues his musicians according to the pace of the picture.

Where music is dubbed off of discs and directly onto the master track, the recorder also takes his cues from the projected film, fading one of them out and the other in as the action changes.

Another popular type of scoring is that in which edited sound-on-film tracks

are used. In this process, the music is first recorded onto film. In the cutting room, the workprint of the finished cut of the visual footage is locked into the synchronizer and the musical themes are cut to closely match the action of the various sequences. These themes are arranged alternately on A and B rolls, so that the music can smoothly blend one into the other in dubbing the master track. He takes his cues from punch marks or grease-pencil strokes on the film.

There are available several complete libraries of recorded sound effects of all descriptions. These effects, too, can be re-recorded "radio style"—that is, right off the disc. Or they can be re-recorded separately onto film and lined up to precisely match the action in the cutting room. In the latter case, a special sound effects track, or C track, is cut with all the effects in synchronization.

Sound Cutting

The editing of sound is a separate science in itself, and one which merits a book all of its own. In a limited space we can only touch on a few of the most important principles involved.

The most important consideration in cutting synchronized direct sound is to keep the sound track "in sync" throughout the length of the picture. At the very beginning of the film, blank leader should

be placed onto both the track and the picture—and master sync marks should be stamped into these strips of leader with a punch. These punch marks will be the master reference points for synchronization all during the cutting of the film.

At the beginning of each scene, sync marks will appear on both the picture and sound track if you have used the clapperboards mentioned earlier. Match up your two strips of film in the synchronizer using these marks, and then make several other sets of marks along the length of the scene with a grease pencil. Use different symbols for each set of markings so that you will not confuse them. You are now free to cut off your slates and trim your scenes to proper length, knowing that you will still have sync marks left to refer to.

In synchronizing "wild track" narration or sound effects with the picture match the two up by careful examination on the Moviola, and make grease-penciled sync marks where they coincide. Use these marks as a guide in synchronous cutting.

Cuts in a sound track must be "blooped"—that is, painted over smoothly with India ink, so that the disturbing bloop noise of the cut is not heard on the sound track.

NEXT ISSUE: Part 18—Tinting

FONDA BASIC MODELS

Speeds and developer times given are normal standards. Accuracy may be obtained by adjusting developer speed times to that of developer tray lengths by the Fonda box in adjacent column.

FILM TYPE	FONDA SIZE	FONDA BOX	APPROXIMATE EXPOSURE (INCHES)		APPROXIMATE DEVELOPER TIME (includes First Dev. & Wash, unless noted, each)						
			Positive (16 in. Dev.)	Negative (16 in. Dev.)	Normal (16 in. Dev.)	Energy	Mask	Acid Cleaning	Energy	Mask	Energy
Regenera	16 mm.	1-1000 1-1500	25 25	25 25	25 25	15 15	15 15	15 15	15 15	15 15	15 15
	8 mm.	1-1000 1-1500	15 15	15 15	15 15	10 10	10 10	10 10	10 10	10 10	10 10
Acetate and Regenera	16 mm.	1-1000 1-1500	25 25	25 25	25 25	15 15	15 15	15 15	15 15	15 15	15 15
	8 mm.	1-1000 1-1500	15 15	15 15	15 15	10 10	10 10	10 10	10 10	10 10	10 10
Regenera	16 mm.	1-1000 1-1500	25 25	25 25	25 25	15 15	15 15	15 15	15 15	15 15	15 15
	8 mm.	1-1000 1-1500	15 15	15 15	15 15	10 10	10 10	10 10	10 10	10 10	10 10
Acetate Color	16 mm.	1-1000 1-1500	25 25	25 25	25 25	15 15	15 15	15 15	15 15	15 15	15 15
	8 mm.	1-1000 1-1500	15 15	15 15	15 15	10 10	10 10	10 10	10 10	10 10	10 10

YES, with a Fonda you can choose your own speed range (see chart). But more important, regardless of speed, you need never worry about film slack. The patented Fonda top-friction drive eliminates your biggest operating hazard.

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Bolex 16 Conversion

(Continued from Page 4051)

needed to bring back the picture

THOMPSON ACTION FINDER

During the many years that the writer has been shooting a camera, he has often lamented the absence of a suitable finder for 16-mm. cameras, and it was this that prompted him to devote much time to designing the finder featured in this *Alexia* camera.

The main requirement of a desirable finder is that it supply approximately the same sized image as the standard 35 mm professional model, and yet be light enough to mount on the smaller 16 mm camera. The optical system of the Thompson finder used in this conversion model is based on lightweight magnesium in a single casting. The front element requires no shading from direct rays of the sun, and the finder gives a clear, brilliant image (24 by 3 inches sprigite, correct left to right when using the 15 mm lens) at all distances and under all light conditions, without focussing. Calibrated scale insures perfect adjustment for parallelism and the job on the camera in which this finder sets will also take the 35 mm studio professional model. This finder meets the demands of fast-action shooting admirably and has met with enthusiastic approval from all who have used it. For focal length lenses in excess of 35 mm, images are recorded.

Other features of the conversion model include provision for inside filter-holder behind the lens for gelatine filters, a ground in making aerial shots or running inverts.

A master box and sunshade with slots for two glass filters, polarized screens, diffusion, etc.; see also optional equipment.

The mechanism driving the take-up pulleys on the magazine is geared directly to the motor itself and is not connected with the camera proper. Shooting can be either forward or reverse without having to cross the take-up belt on the magazine for reverse running. This greatly reduces the possibility of bucking on double ex-

posure rewinding, which is a great help in shooting background titles, other double exposures and trick effects. Multiple exposures can be made with perfect registration, and ease in rewinding is notable.

The Thompson Action Finder can be mounted on the front plate of the camera close to the original Bolex three-lens unit, and this reduces parallax to a minimum.

Theatre Practices at
SMPE Convention

Engineering progress, new equipment, methods and practices featured the annual fall convention of the Society of Motion Picture Engineers held at the Hotel Pennsylvania, New York October 20th to 24th.

The large number of papers and demonstrations on the program necessitated a total of 12 technical sessions over the five day period. In addition, a large number of manufacturers and suppliers presented their products to the exhibit audience.

At the convention banquet, held on evening of October 22nd, Dr. John G. Payne of Electrical Research Products Division of Western Electric Company, Hollywood, was presented with the Progress medal for his work in originating and developing a number of commanding improvements in the art of sound recording and reproduction. John A. Munster received the Samuel I. Warner Memorial Award for his contributions to the development of sound engineering, while Dr. Albert Ruse, of RCA Laboratories, Princeton, received the SMPE Journal Award for the best technical paper of the past year, "A Unified Approach to the Performance of Photographic Film, Television Pickup Tubes, and the Human Eye."

Spring convention of the SMPE will be held in Hollywood in 1948.

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30 Years of Technicolor

(Continued from Page 393)

The process of making two-color ambisonic prints with silver sound track was brought out by Technicolor in 1928, and the advantages in respect to focus, cupping, scratching, size of reel and cost of manufacture, were immediate. With the studios of Hollywood launching sound productions in early 1929, the barrier erected against change of usual procedure in production was removed in favor of volume color production.

Jack L. Warner, head of the Warner-Fine National Studios, which company had revolutionized the industry by making the first sound pictures, was the first producer to go for color features on a large scale. His initial commitment, according to Kalman, was for more than 20 productions in Technicolor. On *With the Show* was the first all-talking Technicolor picture.

"As evidence of the increased color-mindedness throughout the industry," Kalman recorded, "Technicolor had contracts for the next months beginning March, 1929, covering photography and delivery of prints of the footage equivalent of approximately 17 feature length productions. This required a doubling of the Hollywood capacity which was ac-

complished in August, 1929. For the year 1930, Technicolor had closed contracts for 36 feature-length productions which would call for some 12,000,000 linear feet of negative to be unanized, photographed and developed during that year in the Hollywood plant, and a print capacity of approximately 60,000,000."

But Kalman realized the sheer costings of the two-color method for leasing acceptance by the industry, and had the research department concentrating on a system which would provide three color prints at reasonable costs. During 1929 and 1930, Technicolor approached \$1,000,000 for plant, equipment, and research work. But the depression of 1931 curtailed film production, and the company felt the effects in a large way. The 1,200 employees at the peak dropped within a few months to 230.

However, a year later, the first three-component camera had been completed, and a unit of the plant ready to handle a nominal amount of three-color printing. With virtually all film companies struggling to weather the financial crisis of the time, the outlook was very dark for the introduction of Technicolor's new three color system. Walt Disney was persuaded to experiment with one subject, *"Flowers and Trees,"* which proved a great success. As a result, he signed a contract to produce his cartoons in Technicolor, obtain-

ing, as a concession for pioneering the process on the screen, an exclusive three-year contract for the cartoon field.

Even though the base price for prints was dropped from seven to five-and-one-half cents per foot, the major studios went not too interested in adding extra costs to productions at a time of low box office returns. It looked like Technicolor would have to again produce a feature for show-case purposes, when Mervin C. Cooper and John Hay Whitney contracted to produce in color for their Pioneer Pictures. While searching for a suitable story, a short end short, *"La Cucaracha,"* was made in three-component Technicolor by Pioneer, basically to test the system in actual production. About the same period, closing sequences for *The House of Rothschild* and *"Kid Millions"* were turned out, which further served to generate interest towards color among the studio heads.

"Becky Sharp" was finally produced by Pioneer and released early in 1935. This was made entirely within the studio walls—no externs—to become the first feature production made in three-color Technicolor. Walter Wanger's *"Trail of the Lonesome Pine,"* produced shortly after the former, was an excellent demonstration of Technicolor on an exterior feature. With auspices given the new three color system, many films of Warners and Metro Goldwyn-Mayer were being produced in color, and the plant was making 2,750,000 feet of prints a month during the 1935-36 season.

"Wings of the Morning" was the first Technicolor feature produced in England, lined in 1935, with Ray Rennahan, A.S.C., as Director of Photography. The argument and prints of this production were entirely serviced by the Hollywood plant, but a British affiliate, Technicolor, Ltd., was organized and a complete laboratory was built at West Droyen in 1936. The latter has not only been handling negative processing of the numerous British made productions in Technicolor, but has been turning out color prints of American-made pictures for release in the United Kingdom.

When the new three-color Technicolor process was initially offered to producers, the three original special cameras were increased to seven. In the interval, nearly 20 more have been built at approximate cost of \$25,000 each, and currently it is reported that 10 more are under construction.

Ray Rennahan, A.S.C. functioned as Director of Photography on the initial *"La Cucaracha,"* and *"Becky Sharp"*—and, as a member of the Technicolor staff, has probably shot more color productions to date than any other motion picture photographer, and was honored with Academy Awards for best color photography in 1938 with Bruce Haller, A.S.C., for *"Gone With the Wind,"* and with

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Ernest Palmer, A.S.C., in 1940 for "Blood and Sand."

Since the use of three-color Technicolor by studios, the company has maintained a staff of cinematographers especially trained in the method to collaborate on regular production with Directors of Photography when required. This staff, in addition to Renahan, included W. How and Greene, A.S.C., the late Allen Duvey, A.S.C., William V. Skall, A.S.C., Wilfred Chase, A.S.C., Charles Boyle, A.S.C., Winston Hoch, A.S.C., Art Arling, A.S.C., and William Snyder, A.S.C. Renahan is now under contract at Paramount, Arling at 20th Fox, and Snyder at Columbia.

But the general rule has been that the Director of Photography, after exploring the intonations and angles of color motion picture photography on one production, has been extremely successful in handling future color productions without outside aid. Many of the restrictions suggested by Technicolor have been circumvented by actual production experiences of the cinematographer, which has greatly aided color progress during the past 10 years.

In 1937, Walt Disney released his first cartoon feature in Technicolor, "Snow White and the Seven Dwarfs," which further impressed the importance of color as a box office asset on the studio executives. The increasing number of pictures contracted for production and processing by Technicolor required enlarged laboratory facilities for greater output of prints, and a lab addition was opened and operating in 1939.

At that time, Technicolor was engaged in intensive research on monopack negative and processing. For 34 mm., monopack is similar to Kodachrome—a main-layer stock which allows for taking in a regulation camera rather than the three-strip negative generally employed for shooting in Technicolor camera.

Leonard Smith, A. S. C., was the first Director of Photography to use Technicolor monopack on a major studio production—shooting the exterior for MGM's "Lassie Come Home" in 1942, while the interiors were made on regulation three-strip negative. Monopack was improved and its speed increased, to the point that it was used entirely for both interiors and exteriors on the 20th Century-Fox production of "Thunderhead" in 1944, with Charles G. Clarke, A. S. C., as Director of Photography. For the past several years, the monopack negative has been increasingly used on productions for all or part of negative footage.

For the year 1946, Technicolor hit a high peak of output, delivering total of 165,037,297 feet of positive color prints covering 53 American and five British productions, in addition to the large number of cartoons and short subjects. It is expected that this record figure will be greatly surpassed for 1947, as capacity of the laboratories has been increased

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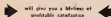
(Continued from Page 355)

spots, each of which represents a single picture or frame.

Every action in the script is estimated in seconds and then broken down into the corresponding number of frames. While this is being done, the dialogue is being written, musical score composed, and sound effects set. All of these *aural* elements must be precisely co-ordinated with the action. The musical themes are conceived while the story is being built, and a staff of four musical directors (aided by a corps of copyists and arrangers) work to blend them into a complete score. Not only must correct moods be set, but the musical hints must fit the action and still maintain something like correct musical form. While the music

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AC-11

When near their hair, the music is revised and revised again to match changes in the action suggested by Disney or the director.

Sound effects, too, must be keyed to the action. The sound effects laboratory, which is like a box-car in Bredem is presided over by noise experts who are all drummers by profession. The sound effects cue sheets are written exactly like the drum parts in musical compositions. A rehearsal of this crew looks like an orchestra of madmen, as they bang away on old tin barrels, moonshine jugs, and sections of tin roof.

Finally all of the visual and aural elements (including music, animation, dialogue and sound effects) are co-ordinated on a master sheet in columns side by side. The result looks like a huge player piano roll. All you have to do is run it through the studio, and out comes a picture—but it will take gallons of sweat and at least six months of painstaking effort.

The Task of Aesthetics

Using the master script as his guide, the director breaks the story down into sequences and assigns them to various animators. The characters have by now been definitely set. All of their proportions and peculiarities are standardized on model sheets which are distributed to the artists. Naturally no one man could draw the vast number of pictures required for a single short subject, but the figures of Disney characters are always identical no matter who draws them, because each artist works with model sheets constantly before him.

The actual task of making cartoon characters more falls to a crew of artists known as *animator*. They work at desks with sloping tops, in the center of which are little ground-glass windows with lights behind them. The animator peels his paper drawings one over the other on this lighted surface so that he can follow all phases of that particular bit of action at a glance. For example, the next picture shows the leg lifted and

moving forward, and the top panel shows the finish of the sweep with the leg out in front. These are the "key drawings," showing the extremes of the action.

Next, an artist known as an "in-betweener" takes these *key drawings* and draws the number of pencil sketches needed to fill in the action between the *extremes*. Later, a "clean-up man" will go over this series of drawings, smoothing out the rough curves, tracing any superfluous sketch lines, and making sure that all of the tiny details have been included.

When an animator completes a sequence of these pencil drawings (which are known as *roughs*), he sends them to the Test Camera Department where they are photographed in succession on black and white film. The film is developed, and a print (spliced as a *loop*), is sent back to the animator along with the original rough drawings. The animator runs the loop over and over again in his *Moviola* to check the smoothness of the action.

He makes whatever corrections are necessary, and when the bit of action is approved he sends the reel loop to the Cuing Department where it is cut in continuity and synchronized with the sound track of the production. The director reviews each scene from his files once a week in a small projection room (or "sweet-box") which is equipped with sound and blackboards for making notes. Each approved sequence is cut into a master reel—until, finally, the entire picture is assembled in reel form. This footage is then previewed by a large audience of studio personnel in the main theatre, so that audience reaction can be noted and pointed up where necessary.

Inking and Painting

Having finally received the official OK, the maps are sent to the linking Department where they are carefully traced in ink onto sheets of transparent celluloid.

Following the tracing of the outlines, the various solid areas of the characters are painted in full color. The paint is applied on the backs of the cells so that the inked lines will stand out. Highly skilled girl artists keep the colors uniform by referring constantly to color samples which they keep before them.

Doty has found that he cannot buy commercial paints fine or brilliant enough to suit his requirements—so he manufactures more than 2,000 separate color pigments in his own laboratories. The paints are made to stick to the celluloid by means of a secret chemical ingredient—but they are water-soluble, a fact which permits the cells to be washed and used over and over again.

Meanwhile, appropriate backgrounds have been laid out and carefully painted



to harmonize with the colors used on the characters. These backgrounds are sometimes highly intricate works of art which could stand on their own merits in any museum.

Getting It Onto Film

When the inkling and painting of the cells has been completed, they are sent (together with their matching backgrounds) to the Production Camera Department. Here, each cell is individually photographed by a three-color camera.

If the background is not required to move or change throughout the scene, it is securely locked into place and the transparent cells are placed over it so be shot in order, one by one. If the background is to move (as for a scene in which one of the characters walks down the street), it is painted on the form of a long strip and fastened onto a bar geared to a lever. For each exposure the bar is moved a distance varying from 1/40 of an inch to 2 inches, depending upon the rate of movement of the character.

The camera can be made to "zoom in" or "pull back" by moving it in or out a fraction of an inch per exposure. A set of gears linked to the focusing ring of the lens assures sharpness as the distance from camera to subject changes. All of the gears on the camera stand are precisely calibrated so that camera movement is always smooth and steady.

The marvellous Mulsplane camera is a giant machine developed by Disney technicians to add the illusion of three-dimensional depth to cartoon composition. Filling a two-story room, this camera requires the attention of a crew of six men, and is regulated by a huge control board.

In Mulsplane filming, the separate elements of the scene—such as trees, rocks, a lake, the distant shore, and the sky, are painted on glass and mounted at different distances from the lens, with the character usually appearing on the level closest to the camera. When the camera moves, these separate scenic elements appear to move in natural relationship to each other, and a convincing illusion of perspective is produced.

When a complete scene has been shot, it is sent to the Technicolor plant for developing, after which it is returned to the Walt Disney-Caring Department, where it is spliced into the master color reel. In the final synchronizing process it is carefully matched up with the sound track, printed, packed into cans, and sent on its way to scanner brighter to the four corners of the earth.

That's all there is to the making of an animated color cartoon. It should prove an amazing weekend project for the home movie enthusiast.

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The sixth edition of the American Cinematographer Hand Book and Reference Guide, indispensable for both professional and amateur motion picture photogra-

phers and cinema workers, has just been issued by Jackson Rose, A. S. C., and ready for distribution.

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formative tables, charts, lens angles, formulas, etc., for 35 mm, 16 mm, 8 mm and mini-cin films. All of the 300-odd pages, including color charts, have been brought up to date to cover latest models of cameras, projectors, lenses, and both monochrome and color films of all manufacturers.

Original compilation of the material in the handbook was assembled by Rose, a veteran of nearly 40 years as a motion picture photographer on numerous Hollywood productions, more than 12 years ago. He found the data available as an aid in his work in the studios, and soon had other cinematographers requesting copies of his material for guidance. Thus, he published the first issue of his compilation in 1935, and changes in film emulsions, cameras, projectors and equipment, and other factors, necessitated frequent revisions and issuance of further editions.

During and since the war, the Handbook has been widely used by various photographic services of the United States Army, Navy, Marines, etc., as the only accepted reference work of its kind. Virtually all of the Directors of Photography and members of the A. S. C., together with numerous cinema technical workers in the studios, continually use the Handbook in photographic and laboratory activities.

Kodak's Bennett Retires

Harold M. Bennett, manager of the Cine-Kodak sales division of Eastman Kodak Company since 1934, has retired after 40 years of photographic activity—72 of which have been with Kodak.

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Historical Development Of Sound Film

(Continued from Page 298)

probably stimulated by the work of Western Electric and others, the General Electric group combined their Polyphosphophone with moving pictures and held a demonstration at the State Theater, Schenectady, in February, 1927, before a group of newspaper men and engineers. This system of combined pictures and sound was called the Kinetographophone. The demonstration included speech and several musical numbers produced by amateur talent. Later that demonstration was given at the Rivoli Theater in New York.

Mar. 1927: It was reported that five of the big producers were negotiating with General Electric to compete with Movietone and Viaphone.

1926-27: The research laboratory of the Westinghouse Electric and Manufacturing Company, not to be outdone, carried on the development of a system of sound recording, using for its light modulator the Kerr cell based on the principle of the rotation of a beam of polarized light by electrostatic means.

Toward the end of 1927, Paramount released its picture "Wings," with a sound score prepared by the General Electric group. This score was used in several different ways. At the Corona Theater, New York, the airplane sounds were taken from disk recordings using a multiple variable device and synchronized by an operator back stage. The effects were reproduced in other theaters through the use of condenser-discharge devices as well as from a score recorded on film.

1928: The sound picture work of General Electric and Westinghouse was combined into one system and handled by a new subsidiary of the Radio Corporation of America called RCA Photophone, Inc. The variable density Kerr cell method of recording was dropped, and the variable-area system further perfected under the aegis of Photophone. RCA Photophone announced at the trade that it had perfected reproducing apparatus and would equip theaters.

Oct. 1928: Shortly thereafter, RCA acquired the B. F. Keith and Orpheum chain of theaters and the FBO Producing Company. A subsidiary was formed called Radio Keith-Orpheum. Through this producing organization, sound pictures made by Photophone's methods were introduced to the public. The first efforts along these lines were limited to the presentation of musical accompaniment, the first picture was "The Perfect Crime," which included some dialogue sequences. Important stage plays were acquired by the RKO producing organization, including the very successful "Rio Rita," which they produced as a sound picture.

Feb. 9, 1929: RKO Productions, Inc., announced that they had selected "Radio Pictures" as the trade name for RKO Productions (which was the motion picture producing and distributing unit of the Radio-Keith-Orpheum Corporation, sponsored by the General Electric Company, the Westinghouse Electric and Manufacturing Company, and National Broadcasting Company).

An affiliation was subsequently effected with the Pathe Exchange, Inc., which adopted the RCA Photophone System of recording in the production of sound motion pictures. The first Pathe production shown with a musical synchronization was "Captain Swagger" with Rod La Rocque, and this was followed by several others in rapid succession. The Pathe organization also released a sound newsreel recorded by the Photophone process.

Jan. 1929: RCA closed a deal for the acquisition of the Victor Talking Machine Company.

Mar., 1929: RCA, Tobin and Klangfilm announced a working agreement.

Dec. 31, 1929: RCA Photophone had equipped for sound about 1200 theaters in the United States and about 600 abroad.

Dec. 1929: It was announced that RCA Photophone would shortly enter all of its sound picture development work at Camden, N. J., combining the General Electric and Westinghouse groups who had previously operated independently.

Miscellaneous Sound Systems

May 22, 1926: Thomas A. Edison declared no field exists for talking pictures.

Nov., 1926: A device called the "Bemaphone" was brought out. It consisted of a Victor "Electrola" with two turntables connected by a shaft to two projection machines in the booth.

Feb., 1927: Synchronophone Corporation offered a new synchronization device for use in small theaters and provided music from disks.

Spring, 1927: Vocafilm and Orchestrophone were made available for synchronizing pictures. The Orchestrophone was designed primarily for small theaters and initially tried in Chicago.

July, 1927: Vocafilm gave a showing using its sound picture system at the Loggare Theater, New York.

Dec., 1927: Orchestrophone, marketed by the National Theater Supply Company, was shown at the Troika Theater, New York.

Bemaphone was demonstrated before the Franklin Institute.

Apr., 1928: Motion pictures were transmitted over telephone between Chicago and New York.

Aug., 1928: M. A. Schlesinger bought control of the de Forest Phonofilm Company. He had previously held an option

to purchase the company, the option had expired in 1927. General Talking Pictures was formed as the new operating company.

Nov., 1928: Amnatic Products (Sonoma) acquired manufacturing, distributing, and licensing rights to Bemaphone.

Dec., 1928: Cinephone, a sound device for home use, was offered by DeVry.

Jan. 1929: Patent sound installations approved by Warner.

Sept., 1929: Powers Cinephone was placed on the market.

Dec. 1929: At the end of this year, there were 234 different types of theater sound equipments in use, most of these, produced by the independents, were for sound-on-disk. The total number of theaters equipped for sound of all makes in the United States was 8741. Of these installations, ERPI and RCA had provided 4393.

As has been indicated in the introduction, these notes have treated certain developments very fully and have made only the briefest mention of some others. This is not to be construed as a judgment of relative importance alone; rather, it also has been decided on the basis of what has previously been written on the subject, and the author's most intimate knowledge of certain details. For example, the material on the Case work has, for the most part, never before been made public; and even this could not be reviewed in great detail in an article of this kind. It is hoped, however, that enough has been told to give the reader a concise picture of what took place during this rather brief development period.

It has seemed appropriate to end this history in the early thirties, since at this time sound-on-film had completed the usual stages of its development, and had justified its existence as a commercial achievement of the first order.

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Art Direction

(Continued from Page 397)

to be big and rich, and yet not look like the ballroom at the Waldorf," he added. "We finally made the drawing room two stories in height, with spacious balconies at one side opening upon a broad staircase which sweeps impressively down into the drawing room, where the guests are assembled and the ceremony takes place," Sternad said. "All corners, angles, backgrounds and wall surface tones which would provide separation between players' faces and costumes and the walls themselves were figured out in advance to the full satisfaction of everyone concerned. The time we spent in buildups saved costly production time later on the set."

In preparing for shooting of "The Reckless October," a whimsical comedy drama which has a racetrack theme as its background, but not as its story line, Sternad found a new problem.

"We had to show action taking place at Churchill Downs during the running of the Kentucky Derby," he explained. "That was a major problem in this Technicolor story. Even though we used long shots of the Downs, and then other footage taken at Del Mar Track, where we shot with our own crews, horses, train-

ers and jockeys, it was still a headache to plan."

Finally, Sternad bridged the gap between the long shots at the two racetracks, and his closer shots of dramatic scenes in the grandstands and around the barns—by the use of color.

"We used color in the backgrounds and in the costumes of the players to blend the sequences in natural transition to the eye," he said. "There was no loss of reality although our closer shots were taken on sets built at Columbia Ranch and tuned to match the grandstands at the tracks."

Furthermore, at the ranch I was able to swing the grandstands around to face into the sun. This afforded much better lighting for color photography. Real grandstands, according to Sternad, "usually face away from the sun which makes them difficult to use for color photography. Also, by facing the set into the sun, cameraman Bill Snyder, A. S. C., had light for a maximum day of shooting, an important economy factor."

A different situation was faced by Walker Holcher when he was assigned as art director on the comedy, "The Making of Mille." He recalled that fellow art director had told him about Joe Walker, A. S. C., having an aversion to shooting wood-grain paper as a wall surface.

"I was very unhappy," Holcher said, "when I found that I was going to have

to use a set which had wood-grain paper on its walls for some test scenes which Walker was shooting with Evelyn Keyes and Glenn Ford, who star in the film."

"When I came on the stage during the shooting," he said, "I asked Joe how he liked the wall surfaces. To my surprise, he told me that they were very acceptable. When I explained about his aversion among Columbia art directors as a cameraman who did not like to shoot wood grain paper, he merely smiled."

"That was a long time ago," he said. "There was a set on which the paper was varnished and given a high gloss that I didn't like. This wall surface is fine, he assured me."

"That bit of information from Walker enabled me to go ahead and use a nice wood-grain paper on many huge department store and showroom interiors in the story. The sets were built more rapidly, they looked good and photographed well, and everyone was happy."

Holcher holds to the belief that no location set should be approved for shooting without the Director of Photography being there. His consent was borne out in the selection of a location to be used as a Foundling Home in the same picture, "Mille." The McKinley Home for Boys, near Hollywood, had been okayed for use at a time when Walker himself was unable to personally check the site. Later, with Holcher, he got a look at the location and turned it down.

"I hastily agreed with Joe on his decision," Holcher declared. "Three days were scheduled for the shooting of this sequence at the Foundling Home, and at this first site there was sunlight on the face of the set only half the day. Limited to half-day shooting, that sequence would have stretched into a week—at extra labor and expense."

Walker and Holcher had a huddle with the producer, Casey Robinson and Director Henry Levin, and a new location at the Penning Home in Wilmington was approved for the sequence.

"Here we found a setting much more readily adaptable for the picture," Holcher said. "And we were able to use the morning light on the front of the building, and then shoot all afternoon at the rear of the structure. Another example of efficiency and economy gained through cooperation."

While Orson Welles was working as production-director on "The Lady from Shanghai," he asked for a huge kitchen which would definitely establish itself as part of a great, palatial mansion.

"I designed a kitchen that was big enough for the White House, and automatically started to come down the gleaming walls with a bit of off-white paint," explained Sarges Carne, the art director on the picture.

Buddy Lawton, A. S. C., the cameraman on the Welles picture, took a look at the

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set and asked me why I was using the off-white paint.

"When the scene calls for gleaming white walls, like this, he said, 'I like them perfectly white. Let them shine all they want to. They're just right for me!'"

"Note: I'd only started finishing the wall surfaces," Carne explained, "it was easy to give them the gleaming white that Lawton liked. On the screen the kitchen looks beautiful. And it gleams. Yet, some cameramen would much prefer a soft, warm surface before the lenses of their camera when white is called for. Each cameraman is different. I always show them wall materials and paint surfaces, as well as fabrics, before going ahead with work on important sets."

Carne has established a personal policy of having frequent battles with both cameramen and director, as well as with head gaffer and others intimately concerned with the work, to assure that there will be no waste of materials or loss of time.

The way Carne looks at his profession, the art director has to be a specialist in taking the imaginative ideas of the writer and the orally expressed wishes of the director and cameramen and produce for them a physical setting which can be photographed. Something which will give them all a satisfactory answer to the mental

picture each of them has in his own mind.

An outstanding example of practical cooperation between the art director and the cameraman came during preparation for the melodrama, "The Sign of the Cross." This psychological film had to create a very powerful dramatic mood. It demanded the fullest awareness of each department in its working with others.

Searges Carne, the art director, spent hours in huddles with Burnett Guffey, A. S. C., Director of Photography, and with John Sturges, his own brother, who was director on the living Cameranga production.

The whole photographic theme of this picture, Carne said, was clearly established before we constructed the first set. "We did it from models. There was a real meeting of minds," the art director added, "with everyone bowing in favor of the cameraman, Guffey, to make sure he would have plenty of interesting angles, great beams, intriguing windows and doors, and space for long shots and intimate, close corners to keep this set interesting for a full nine days of shooting."

"I am quite sure," Carne declared, "that the dramatic impact of these sequences in the production will illustrate the genuine all-around benefit of both art director and cameraman thinking first of the other man's problems, before definitely

putting his plans into action on any given production."

As a final example of striving to aid the cameraman, Carne recalls a key scene in the climax of the same picture. Guffey was shooting a scene which included the sea, the cliffs, the sky and his players in the foreground.

"Then we found that there was no horizon line. The sea just seemed to hang in mid-air in front of the beautiful sky backings we had specially painted for the picture," Carne said. "Guffey needed a moving, reflecting surface as a marine horizon somewhere between the sky backing and the cliff on the set."

After some heated conferences, Carne finally came up with a curved curtain, and rigged up a moving, reflecting surface which looked very convincing during the short time it was on the screen.

"That just goes to show you," concludes Searges Carne with a smile, "that we art directors sometimes actually move heaven and earth to give the cameramen that extra bit of realism he may need to solve a particular photographic problem."

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Background Projector

(Continued from Page 391)

with the projector. 5-inch, 6-inch and 7-inch. Each lens is installed in a specially-designed Mitchell lens mount. The lens mount fits on the front of the projector head and is held securely in place by a lens retainer. Lens mounts may be removed or installed merely by turning the lens retaining knob. Interchanging lenses does not alter the rest of the optical system. Lenses are all F 2.0 Super Cinephus, manufactured by Bausch and Lomb.

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Bell & Howell Company announces availability of newly-designed all metal film storage cases. Twelve 8 mm. 200 foot reels may be stored in one model, while a dozen 400 foot cans of 16 mm. are accommodated in the other. Upper portion of each case is hinged for easy removal of individual cans, while sectional dividers on inside back and bottom keep reel cans separated.

Leica Desk Viewer

Leica desk viewer for two-by-two inch slides and 35 mm. film strips, is again available through dealers, according to advertisement by E. Leitz, Inc.

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Current Assignments of A.S.C. Members

MEMBERS of the American Society of Cinematographers were engaged as Directors of Photography in the Hollywood Studios during October as follows:

Allied Artists

• Stanley Cotten, *Secret Woman*, with Constance Bennett, Brian Aherne, Barry Sullivan, Michael O'Shea

Columbia

• Fred Jackman, Jr., *Coroner Creek*, (Cintecolor), with Randolph Scott, Marguerite Chapman, George Macready, Sally Ekin, Edgar Buchanan

• Vincent Fisher, *Blonde's Night Out*, with Penny Singleton, Arthur Lake

• William Snyder, *The Return of October*, (Technicolor) with Glenn Ford, Terry Moore, James Gleason

• Phil Tannan, *The Return of the Whirlwind*, with Michael Dune, Lorette Aubert

• Les White, *The Fuller Brush Man*, (Edward Small Prod.) with Red Sutton, Janet Blair, Don McGuire, Hillary Brooke, Ross Ford

Independent

• Karl Struss, *Untamed*, (Adventure Pictures) with Robert Lowery, Martha Sherell

• Phil Tannan, *The Last Nazi*, (Carl Krueger Prod.) with Maria Montell

Lee Bonnell, Raphael Bennett, Al Zandman, David Bour

Metro-Goldwyn-Mayer

• Clark Gable, *Homecoming*, with Clark Gable, Lena Turner, John Hodiak, Anne Baxter, Cameron Mitchell

• Charles Schoenbaum, *Halls of Home*, (Technicolor) with Edmund Gwenn, Janet Leigh, Tom Drake, Donald Crisp, Reginald Owen, Rhys Williams, Louis

• Joe Rosenburg, *B. F. S. Daughter*, with Barbara Stanwyck, Van Heflin, Richard Hart, Charles Coburn, Keenan Wynn, Spring Byington, Margaret Lindsay

• George Rooley, *Scene of the Union*, (Liberty Productions) with Spencer Tracy, Van Johnson, Angela Lansbury, Adolphe Menjou

• Robert Surtees, *The Big City*, with Margaret O'Brien, George Murphy, Robert Farnham, Danny Thomas, Karen Booth, Betty Garrett, Leticia Lehman

Paramount

• John Seitz, *The Long Gray Line*, with Alan Ladd, Donna Reed, Audie Murphy, Dick Hogan, Russell Wade

• Lionel London, *Sansad Sisters*, with Veronica Lake, Joan Crawford, Barry Fitzgerald, George Reeves, William Demarest, Beulah Bondi

RKO

• Nick Musuraca, *I Remember Mama*, with Irene Dunne, Barbara Bel Geddes, Oscar Homolka, Philip Dorn, Sir Cedric Hardwicke, Rudy Vallee, Edgar Bergen

• Harry Wild, *Station West*, with Dick Powell, Jane Greer, Agnes Moorehead, Earl Ives, Gordon Oliver, Guinn 'Big Boy' Williams

• Lauren Bakula, *Berlin Express*, with Merle Oberon, Robert Ryan, Charles Korvin, Paul Lukas, Robert Coote, Peter Von Zernack

• George Bucars, *'Good Sam*, (Rainbow Productions) with Gary Cooper, Ann Sheridan, Edmund Lowe, Clinton Sundberg, Jess Lanning

• Mary Getteman, *'Rachel*, with Loretta Young, William Holden, Robert Mitchum

• Joe Valentine, *Juan*, (Sears Pictures) (Technicolor) with Ingrid Bergman, Jose Ferrer, John Emery, George Coulouris, Richard Ney, Robert Barrer

Selma Royle, Gene Lockhart, Rosina Robison

• Joseph Walker, *'The Velvet Touch*, (Independent Artists) with Rouben Russell, Leo Genn, Claire Trevor, Sydney Greenstreet, Leon Ames, Frank McHugh

• Roy Hunt, *'The Arizona Ranger*, with Tim Holt, Jack Holt, Steve Boadie, Nan Leslie

Selznick

• Paul Eglar, *'Portrait of Jennie*, with Jennifer Jones, Joseph Cotten, Ethel Barrymore, Cecil Kellaway, David Wayne, Albert Sharp

• James Wong Howe, *'Mr. Blandings Buys His Dream House*, with Cary Grant, Myrna Loy, Melvyn Douglas

Twentieth Century-Fox

• Leo Tover, *'The Snake Pit*, with Olivia de Havilland, Leo Genn, Mark Stevens, Celeste Holm, Miriam Gombel

• Harry Jackson, *'Ballad of Fursten Creek*, with Victor Mature, Colleen Gray, Reginald Gardiner

• Victor Milner, *'The Farming Age*, with Jeanne Crain, Don Dailey

• Joseph MacDonald, *'Call Northside 777*, with James Stewart, Richard Conte, Helen Walker, Lee J. Cobb

• Joe LaShelle, *'Deep Water*, with Dean Andrews, Jean Peters, Cesar Romero, Anne Revere, Dean Stockwell, Mae Marsh

Universal-International

• Frank Planer, *'Letters From an Unknown Woman*, (Rampart Prod.) with Joan Fontaine, Louis Jourdan, Mady Christians, Art Smith, Marcel Joumer

• Russell Mery, *'All My Sons*, with Edward G. Robinson, Burt Lancaster, Mady Christians, Howard Duff, Frank Conroy

• Milton Kossler, *'Up In Central Park*, with Deanna Durbin, Dick Haymes, Vincent Price, Albert Sharpe, Thornton Hall

Warners

• Carl Guthrie, *'April Showers*, with Jack Carson, Ann Scheer, Robert Alda, S. Z. Sakall

• Karl Freund, *'Christopher Blake*, with Alexis Smith, Robert Douglas, Ted Donahue, John Hoyt

• Robert Burke, *'To the Victor*, with Dennis Morgan, Veruca Lindfors, Tom D'Arcy, Victor Francen, Richard Walsh

• Ted McCard, *'Johnny Belinda*, with Jane Wyman, Lew Ayres, Charles Backford, Agnes Moorehead, Mabel Paige, Jon Sterling

• Ernest Haller, *'Winter Meeting*, with Bette Davis, James Davis, Jeanne Page, Florence Bates

• Sol Polito, *'Adventures of Don Juan*, with Errol Flynn, Veruca Lindfors, Robert Douglas, Romney Brent, Alan Hale



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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

OF THE AMERICAN CINEMATOPHILE, published Monthly at Los Angeles, California, for October 1, 1940

State of California)
County of Los Angeles) ss

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Walter S. Greene, who has been duly sworn according to law, and has declared that he is the owner of the AMERICAN CINEMATOPHILE, and that the following is to the best of his knowledge and belief a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 7372, Penal Code, and Regulations printed on the reverse of that form, to-wit:

1. That the names and address of the publisher, editor, managing editor, and business managers are: Publisher, A.C.C. Agency, Inc., 1782 N. Orange Dr., Hollywood 28, Calif.; Editor, Walter S. Greene, 1782 N. Orange Dr., Hollywood 28, Calif.; Business Manager, Margaret E. Sauer, 1782 N. Orange Dr., Hollywood 28, Calif.

2. That the owner is: (1) owned by a corporation, its name and address must be stated and also immediately thereafter the names and addresses of all stockholders owning or holding one per cent or more of total amount of stock (if not owned by a corporation, the names and addresses of the individual owners must be given). If owned by a firm, company or other unincorporated concern, its name and address, as well as those of each individual member, must be given. (A.C.C. Agency, Inc., 1782 N. Orange Dr., Hollywood 28, Calif.; wholly owned by The American Society of Cinematographers, Inc., a nonprofit corporation, whose address is 1782 N. Orange Dr., Hollywood 28, Calif.; Officers of the American Society of Cinematographers, Inc. are: President, Leon Rosenfeld, 1782 N. Orange Dr., Hollywood, Calif.; 1st Vice President, Charles G. Clarke, 1782 N. Orange Dr., Hollywood, Calif.; 2nd Vice President, Wm. V. Saut, 1782 N. Orange Dr., Hollywood, Calif.; 3rd Vice President, Lee Gammes, 1782 N. Orange Dr., Hollywood, Calif.; Executive Vice President, J. H. Truesdale, Ford W. Jackson, 1782 N. Orange Dr., Hollywood, Calif.; Secretary, Ray Sherman, 1782 N. Orange Dr., Hollywood, Calif.; Secretary-at-Large, Wm. Basile, 1782 N. Orange Dr., Hollywood, Calif.)

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (1) there are none in state; (2) None.

4. That the two paragraphs next above giving the names of the owner, stockholders and security holders if any, contain not only the list of stockholders and security holders at they appear upon the books of the company but also, in case where the stockholder or security holder appears upon the books of the company as a trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the next two paragraphs contain, (1) statements embraced in a full and complete and correct as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustee, hold stock and securities in a capacity other than that of a bona fide owner; and (2) if there be no human to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds or other securities, then as so stated be true.

5. That the average number of copies of each issue of this publication, or of each issue distributed through the mails or otherwise to paid subscribers during the twelve months preceding the date shown above is:—This information is based upon reports of publishers of daily, weekly, semi-weekly and tri-weekly publications only.

WALTER S. GREENE
Editor

Sworn to and subscribed before me this 1st day of October 1940

(Notary Public) Franklin H. Mills
Notary Public
(My Commission expires July 3, 1949.)

**NEW BELL & HOWELL
ADJUSTO-STAND**

Immediate availability of a new-type projector stand known as the 'Adjusto-Stand,' is announced by the Bell & Howell Company, Chicago manufacturers of precision motion picture equipment.



Made of aluminum alloy, the Adjusto-Stand is guaranteed to support 300 pounds, even though it weighs only 12 pounds itself. The stand is collapsible into one compact unit, and is adjustable in height from 35 inches to 57 inches, a range which assures projection above the heads of the audience. The spinter-finish top is 12 inches by 22 inches, large enough to hold all makes of motion picture projectors.

Three rubber-tipped supporting legs are joined to the shock-absorbing rubber-tipped center post by means of inverted hinged units which grip in two places. Special locks prevent the height adjustment from slipping and a tilt adjustment operated with three chain screws takes care of uneven floor level to give perfect alignment of the picture on the screen. Tilt adjustment of the table may be accomplished in complete safety while the projector is upon it, for although the tilt range is ample in all directions, the table cannot tilt enough to allow the machine to slip off.

Minneapolis Octo Cine

Minneapolis Octo Cine Club launched its fall season with the September 10th meeting at the Main YMCA, with members displaying unusual eagerness for those attending. Film program of the evening comprised a group of member pictures taken during the summer vacation period.

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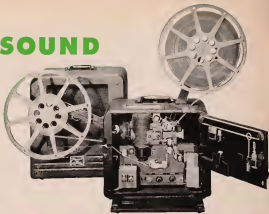
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